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On *Hesperocranum*, A New Spider Genus from Western North America (Araneae, Liocranidae)

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ABSTRACT

A new genus, *Hesperocranum*, is established for *H. rothi*, a new species from California and Oregon. *Hesperocranum* is recognized on the basis of genitalic characters and a form of leg setation suggesting that it is most closely related to the Palearctic genera *Liocranum* and *Mesiotelus*.

INTRODUCTION

The western North American spider fauna, although widely recognized as rich and highly endemic, still remains rather poorly known. A good example of this is *Hesperocranum rothi*, a new species and genus from California and Oregon described below for the first time (although a brief mention of the taxon, as an undescribed genus, was published in a key by Roth, 1985). Despite this lack of attention, *Hesperocranum* is clearly quite remarkable, both morphologically (in having unusual leg setation) and phylogenetically (in showing close affinities to Palearctic liocranine genera).

Leg setation has been an important character in clubionoid systematics since the time of Simon (1897), who used the presence of several pairs of ventral spines on the anterior legs to cluster genera currently placed in the Liocranidae and Corinnidae (sensu Platnick, 1989). It is of interest, therefore, to discover in *Hesperocranum* a form of leg setation that may be phylogenetically useful.

In *Hesperocranum* the anterior legs appear

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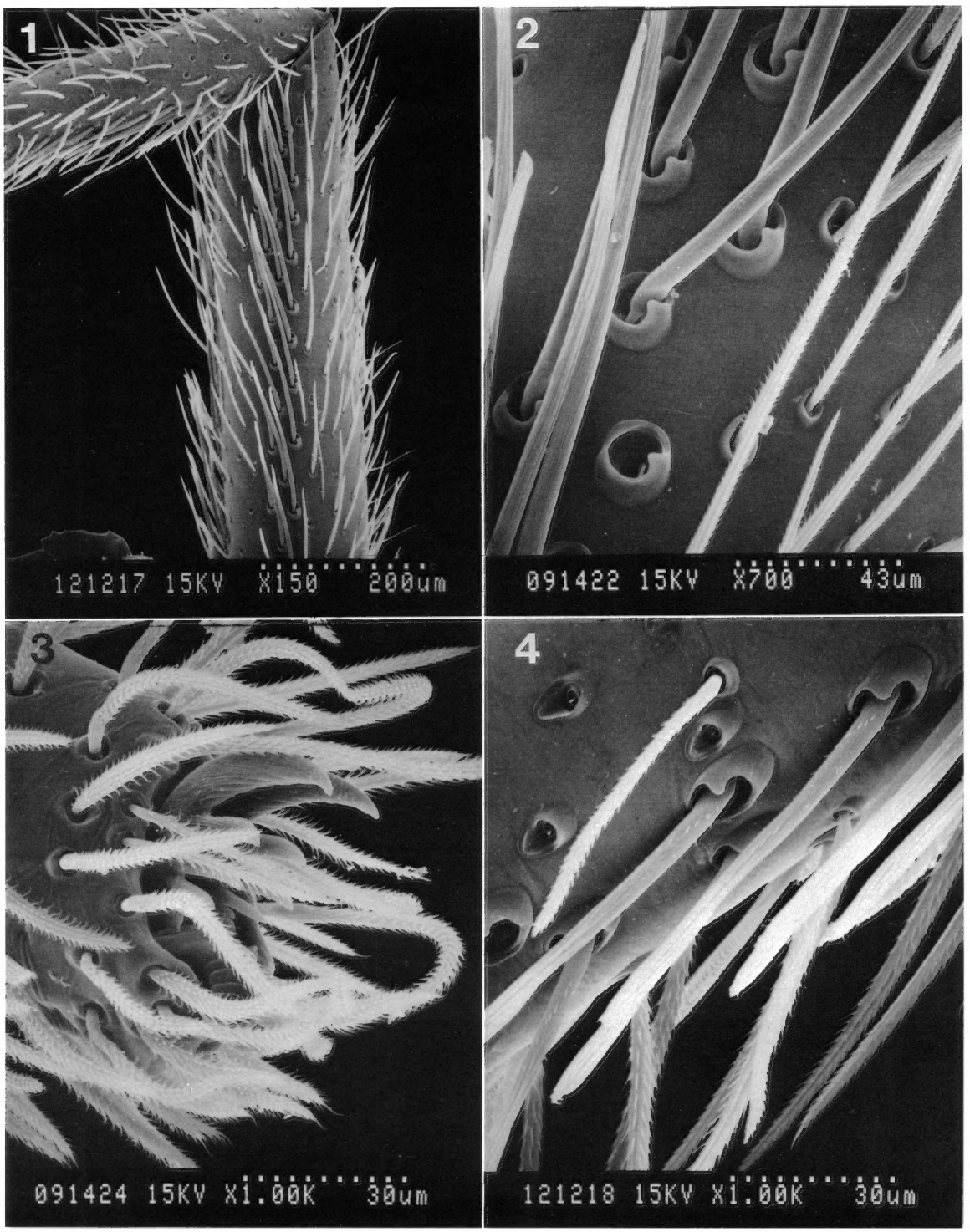
to bear dense ventrolateral rows of scopular hairs which, on closer inspection, resemble diminutive spines (figs. 1, 2, 4). Structurally these bristles, using Forster's (1967) term for short and slender spines, resemble typical (spider, i.e., movable) spines in having a relatively smooth cuticle (although not true for spines in Clubioninae; see figs. 12, 13, 15) along with a basal oblique depression and a pronounced ectal projection on the socket (compare figs. 2 and 4 with fig. 11). Scopular hairs, for example in *Clubiona* and *Cheiracanthium* (figs. 13–16), have extremely "hairy" cuticles and the basal depression and corresponding socket projection are either lacking or poorly developed. The latter modifications appear related to spinal erection; indeed, as observed on living *Hesperocranum*, the leg bristles are erectile. On the other hand, the bristles resemble scopular hairs in size (being shorter than the leg diameter) and in having blunt, if not somewhat expanded, tips (compare figs. 2 and 4 with figs. 13–16). In their distribution and number, the bristles of *Hesperocranum* also seem closer to scopular hairs, being found on the tibiae, metatarsi, and tarsi of the first three pairs of legs. Ventral paired leg spines are typically restricted to legs I and II and are rarely found on tarsi. Furthermore, the high number of bristles, up to 40 pairs per segment, and their multiseriate arrangement more closely resemble scopulae.

A preliminary survey of a variety of clubionoid genera, including representatives of Clubioninae, Anyphaenidae, Corinninae, Castianeirinae, Trachelinae, and Liocranidae (including Phrurolithinae), indicates that leg bristles are not very common, but neither are they restricted to *Hesperocranum*.

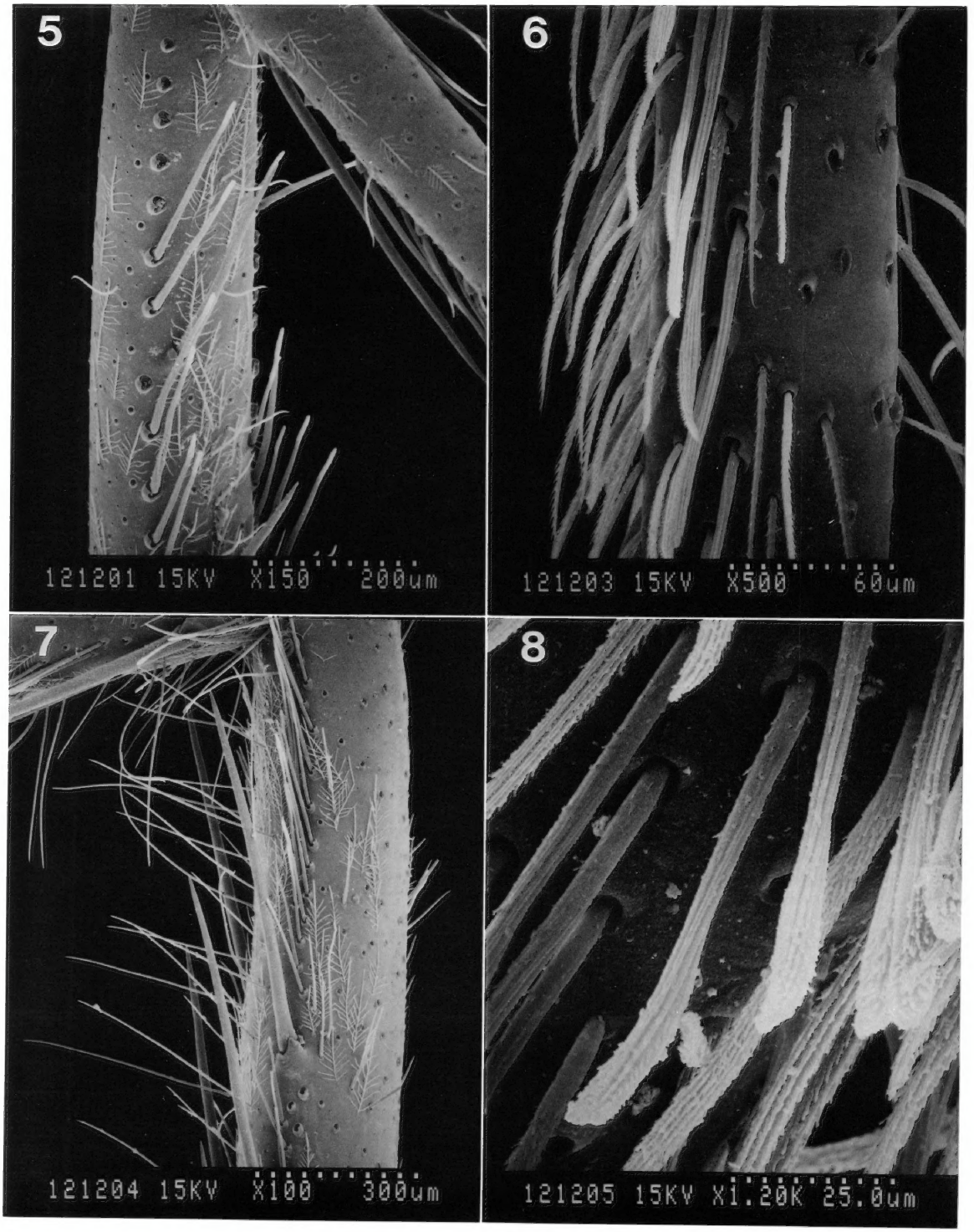
The Palearctic genera *Liocranum* and *Mesiotelus* (figs. 5–8) have similar bristles, with some differences. In those genera, the bristles are in lower densities, being uniserial to weakly biserial, compared to strongly biserial to triserial in *Hesperocranum*, and occur in conjunction with typical leg spines. For example, the armature of the anterior tibiae in *Mesiotelus* (four species examined) have from 1.5–2 pairs of spines and in *Liocranum* (two species examined) from 4–6 pairs. The three genera also appear to be closely related on the basis of potentially derived genitalic characters: male palpal tibia with a prolateral lobe (figs. 21, 25) and epigynum with a similar conformation, including an anterior hood and posterior spermathecal sacs and ducts (figs. 19, 28, 29; see also illustrations in Grimm, 1986, and Brignoli and Gaddini, 1979). Of the three genera, *Liocranum* and *Mesiotelus* are most similar (male chelicerae prognathous, epigynal hood entire, as opposed to bipartite, and legs with recumbent, feathery setae) and may be sister groups. If the Palearctic genera are indeed morphologically derived relative to *Hesperocranum*, then the variation in leg setation may likewise represent a transformation series, with the reduction of bristles and acquisition of spines being derived.

The possibility that leg bristles are plesiomorphic within the Liocranidae is also suggested by the presence of somewhat similar bristles in the phrurolithine genus *Drassinella*. Examination of other phrurolithines (*Orthobula*, *Phonotimpus*, *Phrurotimpus*, and *Scotinella*) has failed to turn up leg bristles (fig. 11). In the three species of *Drassinella* examined, leg bristles were found interdigitated between the ventral spines of the anterior tibiae and metatarsi and also along two ventrolateral rows on the tarsi (figs. 9, 10). The presence of a small number of leg bristles may indicate vestigial retention and, along with the presumed basal position of *Drassinella* among the phrurolithines (Penniman, 1985; Platnick and Ubick 1989), suggests plesiomorphy.

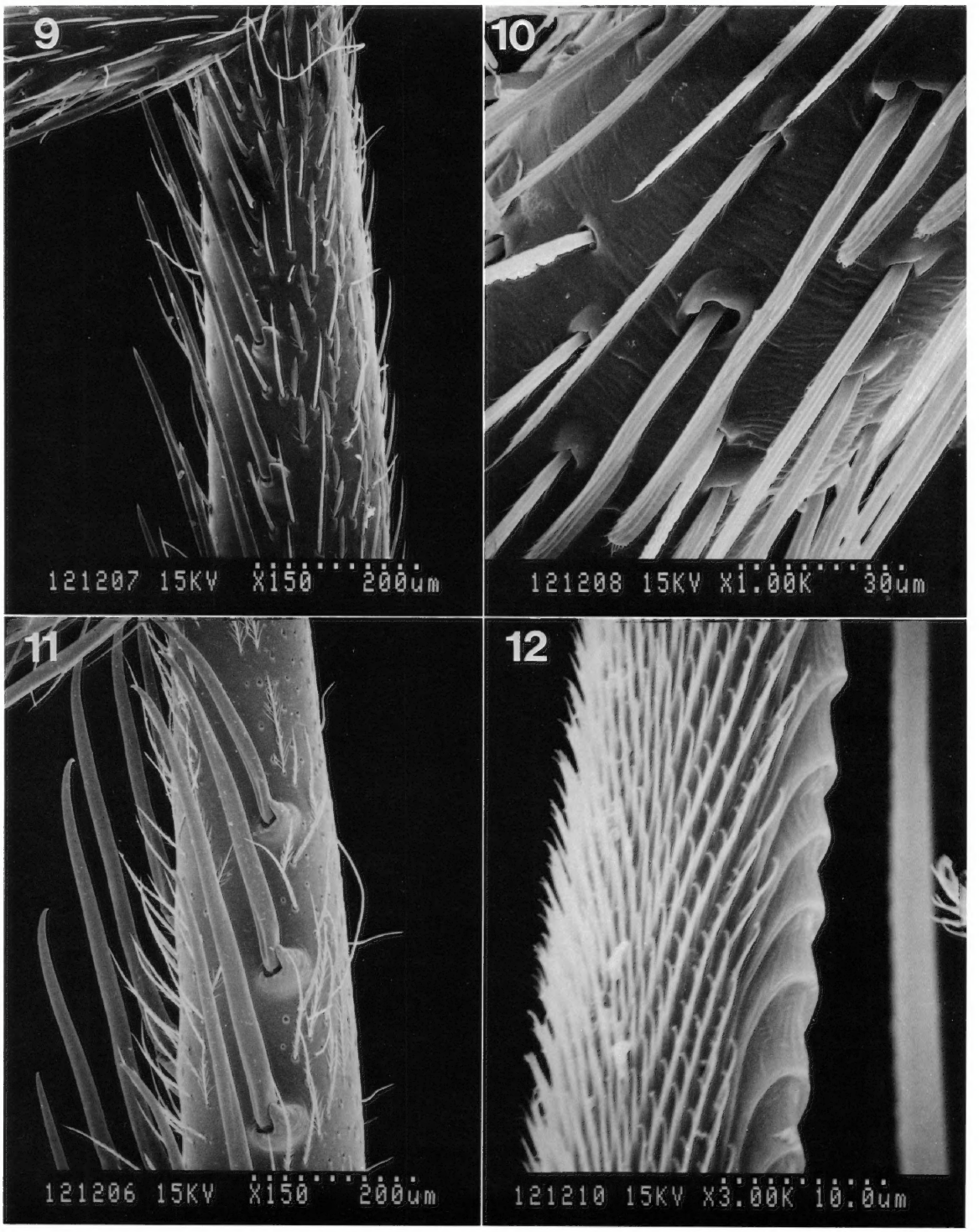
It is worth speculating, therefore, that leg bristles may be synapomorphic for at least Liocraninae plus Phrurolithinae. However, in his analysis of clubionoid spiders, Penniman (1985) separated these groups, placing the relatively derived Phrurolithinae far from the Liocraninae, which he included in Clubionidae. He found no derived character uniting the latter two taxa, however, and evidence from the spine morphology described here (and spinneret morphology as well; see Platnick, 1990 and Platnick et al., 1991) argues against such an association. He removed the phrurolithines from the Liocranidae on the basis of presumed synapomorphies shared to varying degrees with Gnaphosidae, Corinninae, Castianeirinae, and Trachelinae (procurved anterior eye row, female posterior



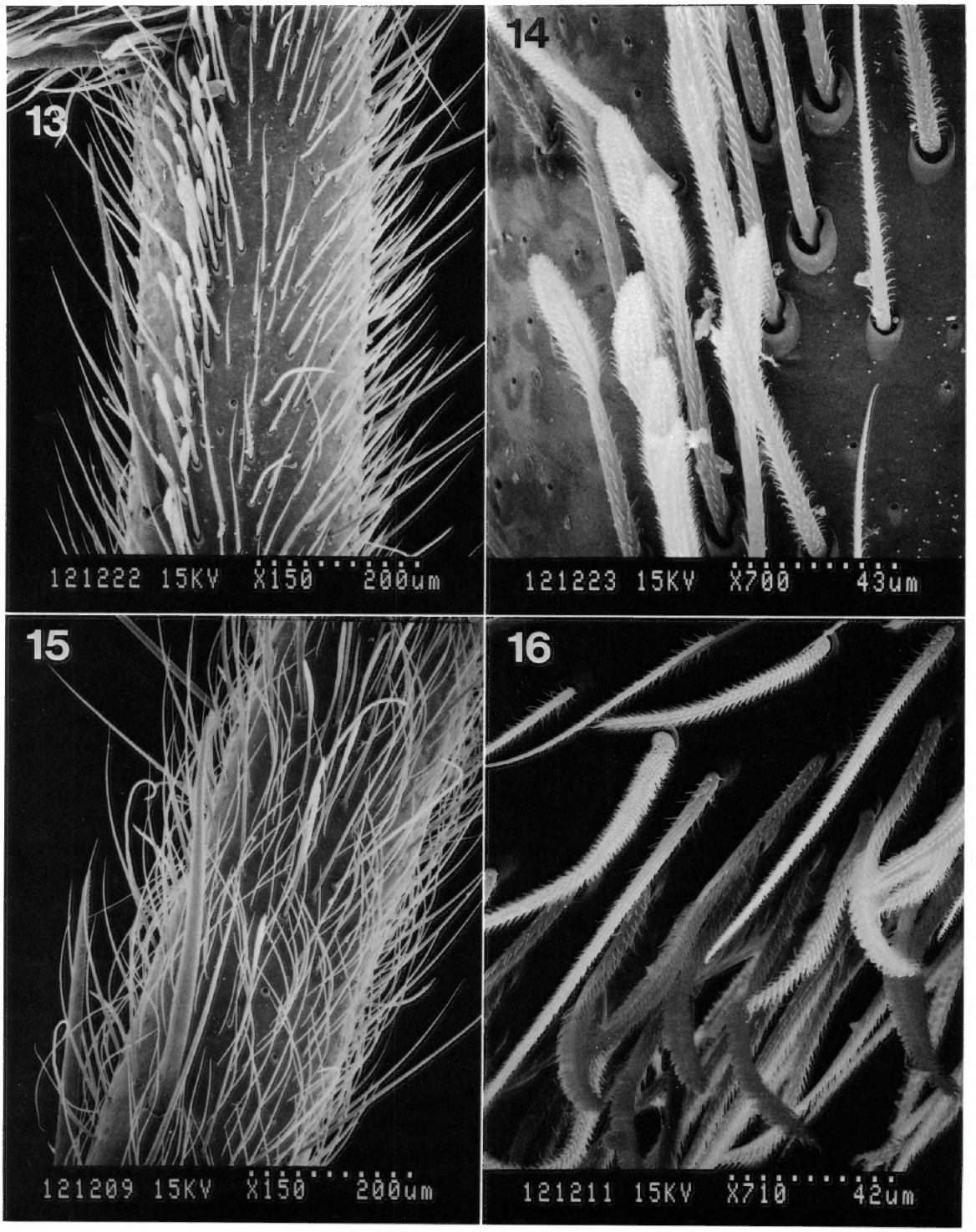
Figs. 1–4. *Hesperocranum rothi*, new species, male. **1.** Left tibia and metatarsus I, sublateral view. **2.** Tibia I, ventrolateral view. **3.** Tip of tarsus I, sublateral view. **4.** Tarsus I, lateral view of midventral region.



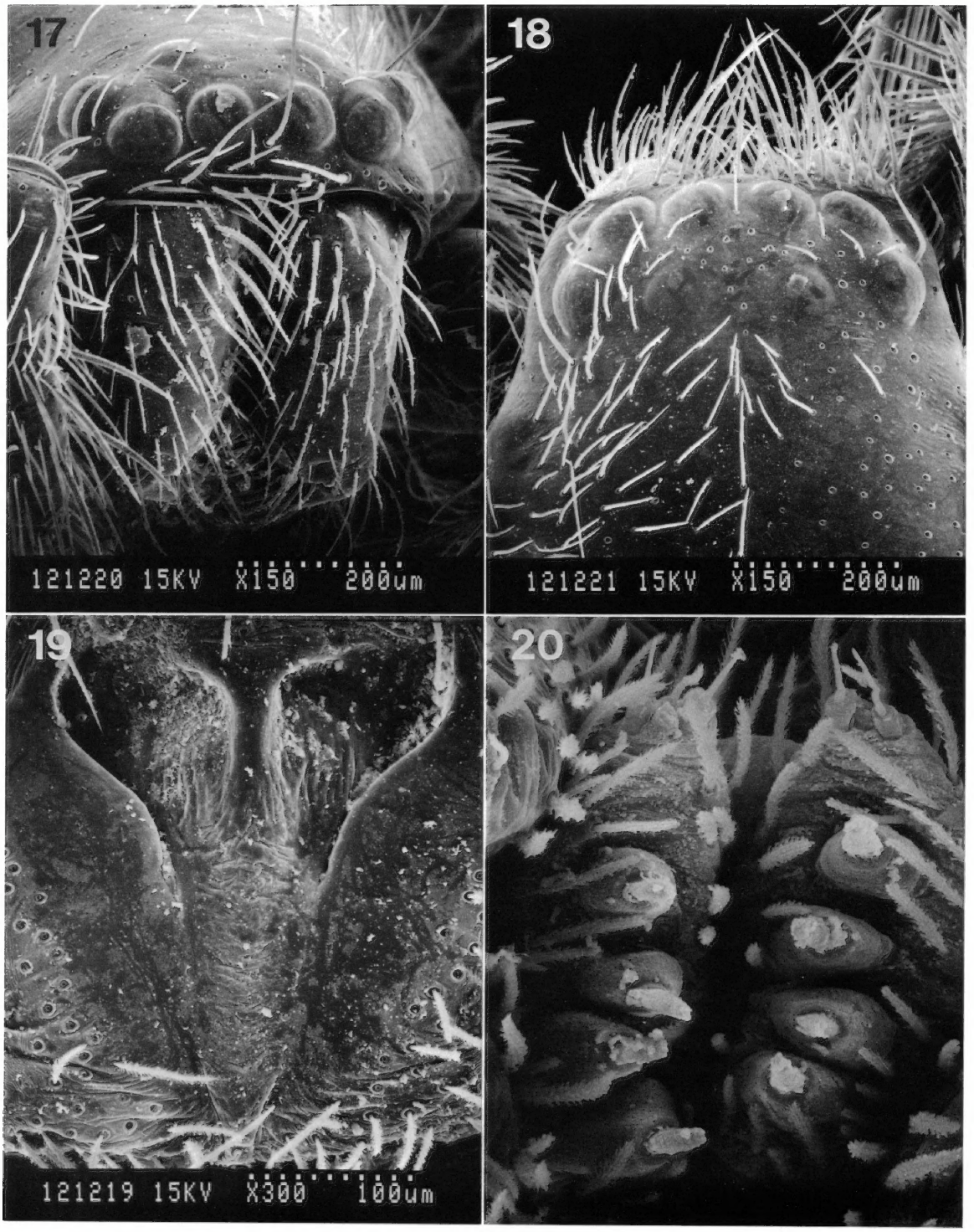
Figs. 5–8. Liocranidae, leg I. 5, 6. *Mesiotelus virgulatus* (Blackwall), female. 7, 8. *Liocranum rupicola* (Walckenaer), male. **5, 7.** Right tibia and metatarsus, sublateral view. **6.** Right tarsus, lateral view. **8.** Right tarsus, sublateral view.



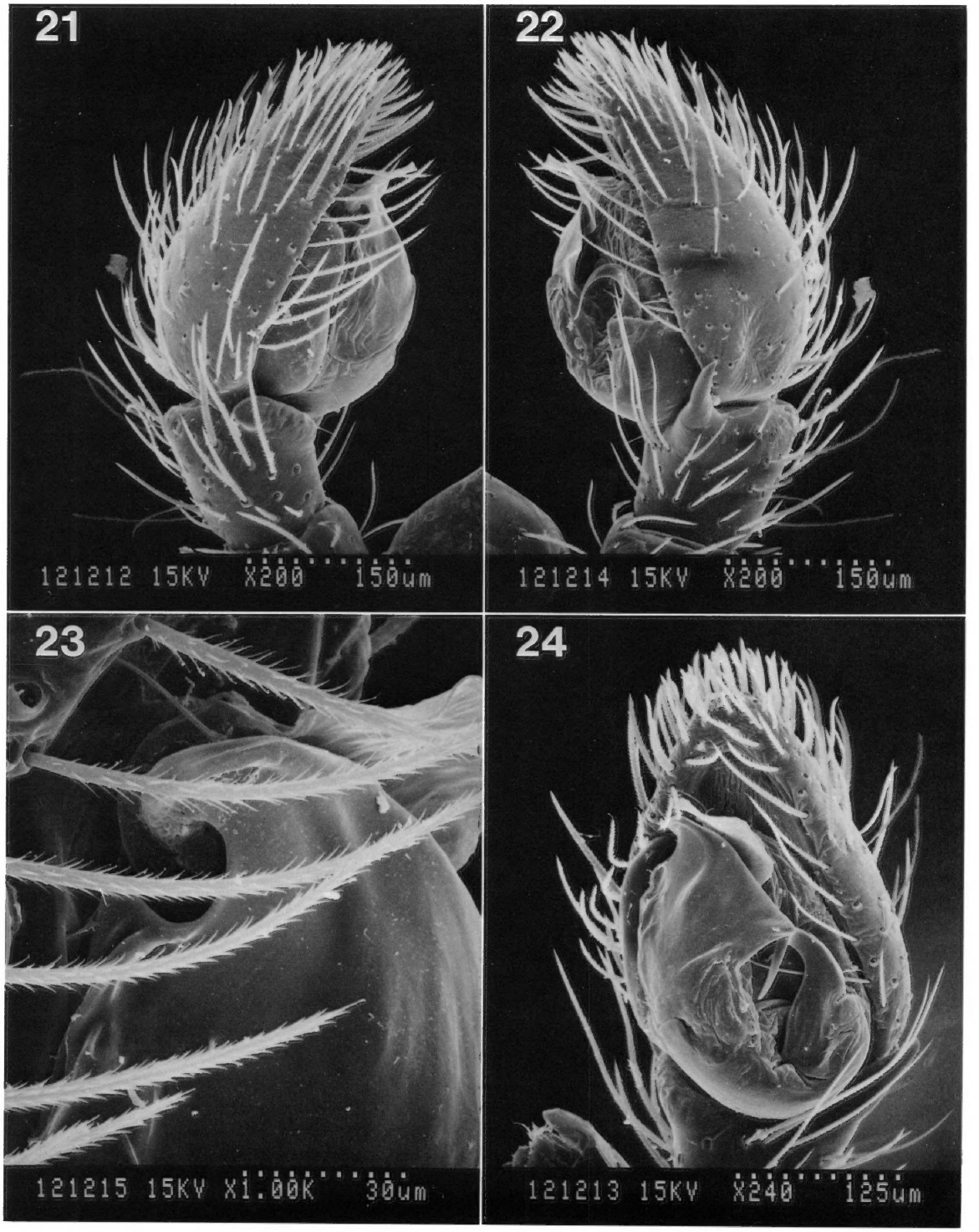
Figs. 9–12. Liocranidae and Clubionidae, leg I. 9, 10. *Drassinella gertschi* Platnick and Ubick, female. **9.** Left tibia and metatarsus, sublateral view. **10.** Left tarsus, ventrolateral view. **11.** *Phrurotimpus* sp., female, left tibia, ventrolateral view. **12.** *Cheiracanthium mildei* L. Koch, female, spine, lateral view.



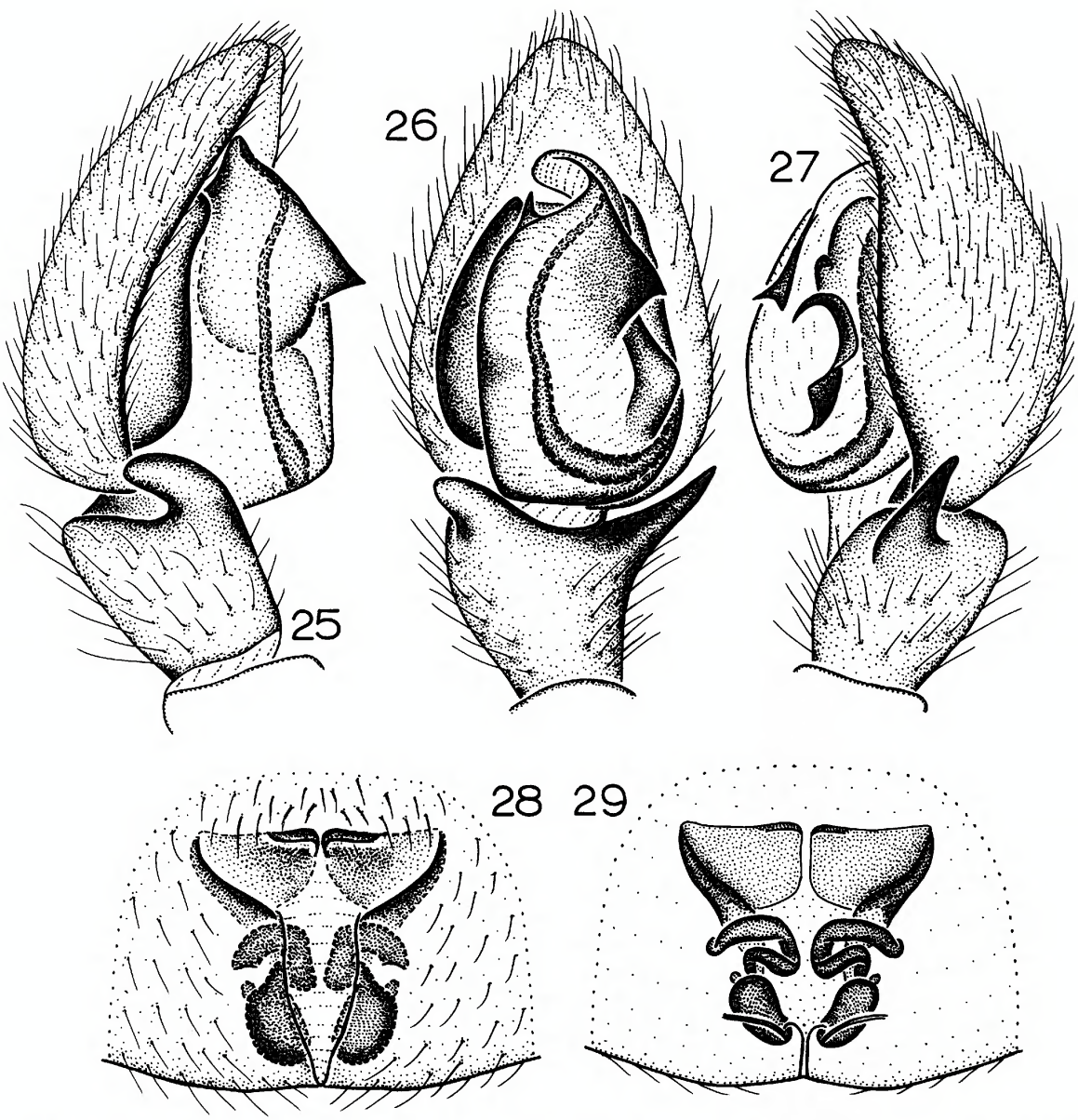
Figs. 13–16. Clubionidae, leg I. **13, 14.** *Clubiona canadensis* Emerton, female, left tibia, lateral view. 15, 16. *Cheiracanthium mildei* L. Koch, female. **15.** Right tibia, ventrolateral view. **16.** Right tarsus, sublateral view.



Figs. 17–20. *Hesperocranum rothi*, new species, female. **17.** Chelicerae and eye region, anterior view. **18.** Eye region, dorsal view. **19.** Epigynum, ventral view. **20.** Posterior median spinnerets, anterior end towards top of photo. Original magnification = 700×.



Figs. 21–24. *Hesperocranum rothi*, new species, male palp. **21.** Prolateral view. **22.** Retrolateral view. **23.** Prolateral view of embolar region. **24.** Ventral view.



Figs. 25–29. *Hesperocranum rothi*, new species. **25.** Palp, prolateral view. **26.** Palp, ventral view. **27.** Palp, retrolateral view. **28.** Epigynum, ventral view. **29.** Epigynum, dorsal view.

median spinnerets enlarged, median apophysis absent, and males with dorsal scutum). However, the strength of this argument is reduced, given the presence of two of those character states in at least some Liocraninae: in *Hesperocranum* the anterior eye row is slightly procurved (fig. 17) and the female posterior median spinnerets are clearly enlarged (fig. 20). Additional characters are clearly needed to resolve these relationships.

Finally, leg bristles superficially much like those in *Hesperocranum* have recently been discovered (by J. Wunderlich) in a species (possibly a tracheline) from the Azores. Given the absence of leg spines in other species of *Trachelas* examined, and until such time as leg bristles are discovered in other nonliocranid clubionoids, it seems most parsimonious to regard this occurrence of bristles as a parallelism.

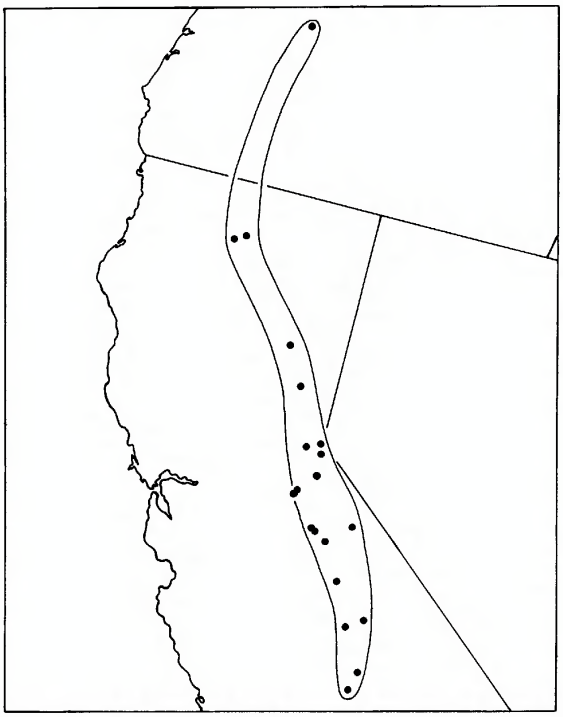


Fig. 30. Western North America, showing records of *Hesperocranum rothi*.

The format of the descriptions and the abbreviations used for morphological terms follow those of Platnick and Shadab (1975); ranges as well as means and standard deviations are supplied for some measurements, all of which are in millimeters. We thank Dr. M. U. Shadab of the American Museum of Natural History for help with illustrations, Drs. P. H. Arnaud, D. H. Kavanaugh, and W. J. Pulawski of the California Academy of Sciences for permission to use the research facilities of that institution, Ms. M. A. Tenorio and Ms. L. Borok for help with the scanning electron micrographs, and Drs. C. D. Dondale of the Biosystematics Research Centre, Ottawa, and C. E. Griswold of the National Museum of Natural History, Smithsonian Institution for helpful comments on a draft of the manuscript. Special thanks go to Mr. K. Mikhailov, Ms. M. J. Moody, Mr. R. Snazell, and Mr. J. Wunderlich, who provided liocranids for study, and Dr. U. Grimm, who provided a useful reference. The following institutions, curators, and collectors allowed access to these relatively rare spiders.

COLLECTIONS EXAMINED

AMNH	American Museum of Natural History
CAS	California Academy of Sciences
CDU	D. Ubick collection
CDFA	California State Department of Food and Agriculture, M. J. Moody
CNC	Canadian National Collection, C. D. Dondale

SYSTEMATICS

HESPEROCRANUM, NEW GENUS

TYPE SPECIES: *Hesperocranum rothi*, new species.

ETYMOLOGY: The generic name is a contraction of *hesperos* (Greek for western) and *Liocranum*, and is neuter in gender.

DIAGNOSIS: The presence of numerous pairs of bristles on legs I–III separates specimens of *Hesperocranum* from other liocranid genera. Although bristles are also known in *Liocranum* and *Mesiotelus* (and perhaps *Drassinella*), in those genera they are interspersed with typical leg spines. *Hesperocranum* can be further distinguished from *Liocranum* and *Mesiotelus* in lacking recumbent, feathery leg setae, lacking prognathous chelicerae in males, and having a bipartite epigynal hood in females, and from *Drassinella* in having pectinate tarsal claws and a male palpus possessing a median apophysis and an unmodified femur.

DESCRIPTION: Total length 2.28–4.06. Carapace pyriform in dorsal view, widest between coxae II and III, narrowed opposite palpal insertion, brownish orange; cephalic area rounded, thoracic groove short, longitudinal; ocular area and clypeus with stiff setae, pars thoracica with fine recumbent setae. From above, anterior eye row slightly recurved, posterior row straight; from front, anterior eye row very slightly procurved, posterior row slightly procurved; AME circular, dark, PME almost circular, light; ALE and PLE oval, light; anterior eyes contiguous; PME separated by almost their diameter, closer to PLE and ALE; ALE and PLE separated by less than their radius; MOQ longer than wide in front, wider than long in back; clypeal height subequal to AME radius. Chelicerae geniculate in males, slightly geniculate in females, anterior face with erect setae, fang furrow with three promarginal teeth and two

retromarginal denticles. Mouthparts and sternum brownish orange, darker along sternal margins; endites rectangular, with very slight oblique depressions (more prominent in males), each with anterolateral serrula and anteromedian scopula arising from white area; labium wider than long, invaginated at posterolateral corners, with one strong seta on each anterolateral corner; sternum shield-shaped, rebordered, produced between coxae IV, with sclerotized extensions to and between coxae. Leg formula 4123; legs brownish orange; tarsi with two pectinate claws, lacking distinct claw tufts; trochanters not notched; trichobothria long, in two rows on tarsi, one row on metatarsi and tibiae, increasing in length distally. Typical leg spination pattern (only surfaces bearing spines listed): femora: I–IV d1-1-0; tibiae: I, II v about 40 pairs of bristles; III v1-2-2 and about 15 pairs of bristles; IV v1-2-2, r0-1-1-0; metatarsi: I, II v about 25 pairs of bristles; III v0-0-2 and about 15 pairs of bristles; IV p1-0-0, v0-1-2, r1-0-0; tarsi: I–III v about 10–15 pairs of bristles. Abdomen dark gray dorsally, grayish-white ventrally, dorsoventrally flattened, oval in dorsal view, anteriorly truncate, widest posteriorly; scutum absent; anterior spinnerets conical, separated by about two-thirds their diameter, two-segmented, distal segment short but distinct; median spinnerets small, slender in males, flattened and longitudinally elongated in females; posterior spinnerets two-segmented, distal segment short. Male palpal femur not modified ventrally; tibia with spinelike retrolateral apophysis and rounded prolateral lobe; tegulum bearing median apophysis, platelike embolus, and membranous conductor. Epigynum longer than wide, with bipartite anterior hood and anterolateral copulatory pores; oval spermathecae and slender, sinuous copulatory ducts present, visible through integument.

NOTE: The existence of this genus was first indicated by Roth (1985) in his key to Nearctic genera of Clubionidae, where it was referred to as an undescribed genus from central California.

Hesperocranum rothi, new species
Figures 1–4, 17–30

TYPES: Male holotype and female allotype from 5.8 mi. E of Highway 4 on Boards Crossing Road, Stanislaus National Forest, Tuolumne Co., California (Aug. 17, 1990; D. Ubick), deposited in AMNH.

ETYMOLOGY: The specific name is a patronym in honor of Mr. Vincent D. Roth, collector of this and many other unusual spiders, who first recognized the species as new.

DIAGNOSIS: With the characters of the genus and genitalia as in figures 25–29.

MALE: Total length 2.28–3.23 (2.66 ± 0.30). Carapace length 1.13–1.36 (1.23 ± 0.07), width 0.92–1.03 (0.97 ± 0.03; N = 8); holotype total length 2.77, carapace 1.23 long, 0.97 wide, femur II 0.94 long. Eye sizes and interdistances: AME 0.08, ALE 0.09, PME 0.08, PLE 0.09; AME-AME 0.03, AME-ALE 0.02, PME-PME 0.08, PME-PLE 0.04, ALE-PLE 0.03; MOQ length 0.21, front width 0.18, back width 0.23. Palpus as illustrated (figs. 21–27).

FEMALE: Total length 2.69–4.06 (3.29 ± 0.34). Carapace length 1.18–1.46 (1.32 ± 0.07), width 0.95–1.18 (1.07 ± 0.06; N = 27); allotype total length 2.73, carapace 1.27 long, 1.05 wide, femur II 1.03 long. Eye sizes and interdistances: AME 0.08, ALE 0.10, PME 0.09, PLE 0.09; AME-AME 0.03, AME-ALE 0.02, PME-PME 0.06, PME-PLE 0.05, ALE-PLE 0.03; MOQ length 0.21, front width 0.18, back width 0.23. Epigynum as illustrated (figs. 19, 28, 29).

OTHER MATERIAL EXAMINED: UNITED STATES: **Oregon:** *Lane Co.:* Limberlost Camp, 6 mi E Mckenzie Bridge, 122°02′ W, 44°10′ N, June 5, 1957 (B. Malkin, AMNH), 1♀. **California:** *Siskiyou Co.:* 3 mi E McCloud, Sept. 2, 1959 (V. Roth, W. J. Gertsch, AMNH), 1♂; Dunsmuir, June 22, 1984 (R. West, CNC), 1♀. *Plumas Co.:* 13 mi N Quincy, Sept. 5, 1988, decaying logs (D. Ubick, CDU), 1♀. *Sierra Co.:* The Cups, Sierra City, Sept. 6, 1959 (W. J. Gertsch, V. Roth, AMNH), 1♀. *El Dorado Co.:* 1 mi SW Meyers, May 24, 1986, May 28, 1988, May 5–6, 1990, June 16, 1990, around cabin (W. H. Tyson, CDFA, CDU), 6♀; Fallen Leaf Lake, Sept. 9, 1959 (W. J. Gertsch, AMNH), 1♀; 4 mi W Kyburz, Sept. 15, 1959 (W. J. Gertsch, V. Roth, AMNH), 2♂, 3♀. *Alpine Co.:* Carson Iceberg Wilderness, 2.6 mi E of E shore of Lake Alpine, Aug. 17, 1990, elev. 7900 ft,

under decomposing douglas fir logs (D. Ubick, CDU), 2♂. *Tuolumne Co.:* 5.8 mi E Hwy 4 on Boards Crossing Road, Stanislaus National Forest, Aug. 17, 1990, elev. 4000 ft, in ponderosa pine bark litter (D. Ubick, CDU, CAS), 4♂, 4♀; SW end of Calaveras South Grove Natural Preserve, Calaveras Big Trees State Park, Aug. 18, 1990, elev. 4600 ft, in ponderosa pine bark litter (D. Ubick, CDU), 1♀; Yosemite National Park, Aspen Valley, Sept. 4, 1958 (V. Roth, AMNH), 1♀; 6 mi S Mather, Sept. 4, 1958 (V. Roth, AMNH), 2♀. *Mariposa Co.:* Yosemite National Park, Glacier Point, Sept. 27, 1944, elev. 7200–7600 ft (B. Malkin, AMNH), 1♀. *Mono Co.:* Big Bend Campground, 5 mi W Lee Vining, Sept. 21, 1961 (W. Ivie, W. J. Gertsch, AMNH), 1♀. *Fresno Co.:* Shaver Lake, Sept. 12, 1959 (W. J. Gertsch, V. Roth, AMNH), 2♂, 1♀; Kings Canyon National Park, Cedar Grove, Sept. 13, 1959 (V. Roth, W. J. Gertsch, AMNH), 1♀. *Tulare Co.:* Sequoia National Forest, Sequoia Guard Station, Aug. 24, 1979, elev. 5000 ft (D. Ubick, CDU), 1♀; Quaking Aspen Camp, Sept. 9, 1959 (W. J. Gertsch, V. Roth, AMNH), 1♀.

DISTRIBUTION: Oregon and California (fig. 30).

NATURAL HISTORY: *Hesperocranum rothi* appears to be restricted to coniferous forests, ranging in elevation from about 2500–3500 ft in Oregon and northern California and from about 4000–8000 ft in the Sierra Nevada. Known collections are from beneath logs and bark debris. The series of specimens from the Stanislaus National Forest was sifted from the bark litter accumulation surrounding the base of a single large ponderosa pine. Female specimens have been collected from May to September, males in August and September.

Three specimens, two mature males and a juvenile, were maintained in captivity for a period of five months. During this time they proved to be very reluctant feeders, refusing live *Drosophila* but occasionally accepting live Psocoptera and Collembola as well as freshly killed *Drosophila*.

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